

Jan. 11, 1938.

R. NEUHAUS ET AL.

2,104,808

FLOW HEAD

Filed April 27, 1936

2 Sheets-Sheet 1

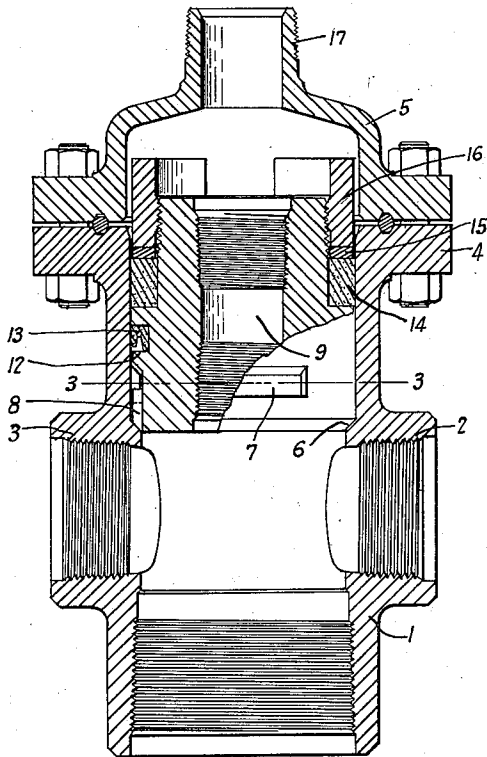


Fig. 1

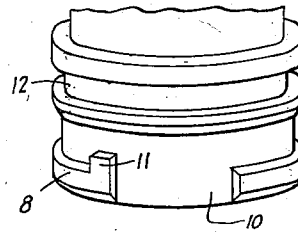


Fig. 2

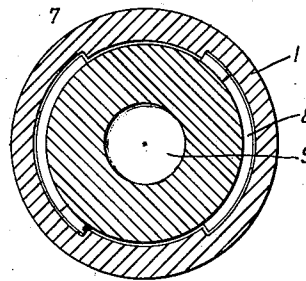


Fig. 3

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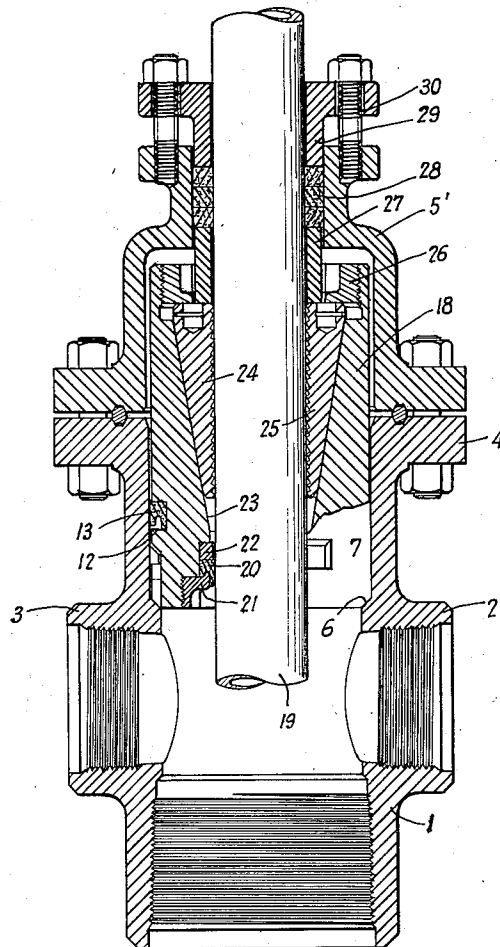


Fig. 4

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## UNITED STATES PATENT OFFICE

2,104,808

## FLOW HEAD

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3 Claims. (Cl. 166—14)

The invention relates to the construction of a flow head for equipping the upper end of a well for flowing. It has particular reference to the hanger by means of which the tubing is supported in the tubing head.

It is an object of the invention to provide a hanger adapted to engage and support the tubing in the head and to also form an effective seal therewith to prevent escape of gas or other fluid from the well about the tubing.

It is also an object to provide a tubing hanger which can be lowered through the usual blow out preventers to a seat in the tubing head and to there seal about the tubing so that the blow out preventers or other similar equipment may be removed.

It is further desired to provide an easily operable and effective means of latching the hanger in place so that it will not be forced out by gas pressure when the sealing equipment on the head is removed.

It is a further object to provide for an adjustable connection between the hanger and the tubing so that said tubing may be readily hung at the proper level in the well.

In the drawings herewith, Fig. 1 is a central longitudinal section through one form of flow head embodying the invention.

Fig. 2 is a broken perspective view of the hanger.

Fig. 3 is a transverse section on the plane 3—3 of Fig. 1.

Fig. 4 is a central longitudinal section through a slightly different embodiment of the invention.

The head 1 which is mounted upon the upper end of the casing, has the opposed lateral ports 2 and 3 threaded for engagement with fluid conducting lines. The head is extended above the ports and has a radial flange 4 for connection with blow out preventers, valves, or bonnets such as 5 shown in Fig. 1. The interior of the head has a cylindrical interior chamber above the tapered shoulder 6 which is above the lateral ports. Toward the lower end of the cylindrical portion there are formed two opposed inwardly projecting lugs or flanges 7 arranged in horizontal position. Between these lugs are spaces through which similar lugs 8 on the hanger may pass.

The hanger shown in Fig. 1 is cylindrical in general outline and adapted to fit within the tubing head. It has a central axial passage 9 which is threaded at its upper and lower ends for engagement with the lift nipple and the tubing respectively.

The flange 8 is formed on the outer surface of

the hanger adjacent the lower end. It extends about the circumference of the hanger except for spaces 10 through which the flanges 7 on the head may pass. At one end of each flange or lug 8 is an upwardly extending finger 11 which acts as a stop to limit rotation of the hanger when it has been seated upon the shoulder 6 in the head.

There is an intermediate recess 12 on the outer surface of the hanger to receive a packing ring 13. Said ring has an outer lip adapted to be compressed within the head and said lip is presented downwardly so as to be expanded by fluid pressure from below.

Toward the upper end of the hanger the outer diameter is reduced to receive packing ring 14, a metal ring 15, and a gland 16, screwed upon the upper end of the hanger.

This hanger is adapted to be mounted upon the upper end of the tubing when said tubing has been introduced into the well. It is lowered through the blow out preventer until the hanger seats upon the shoulder 6 in the head. A lift nipple screwed into the upper end of passage 9 is used to set the hanger. The lift nipple is used to partly rotate the hanger to bring the flange 8 upon the hanger below the flange 7 in the head so as to lock the hanger from being moved upwardly under pressure. The lug 11 on the flange 8 will engage the end of flange 7 in the head and stop the rotation in locked position of the hanger.

The lift nipple may then be withdrawn, the gland 16 tightened and the blow out preventers removed from the head. Any type of removable plug in the tubing may be employed when the tubing is set, this being no part of the present invention. The bonnet 5 may be secured upon the head in place of the safety equipment which was removed. An externally threaded nipple 17 on the bonnet serves as an attachment for flow fittings as may be desired.

In the Fig. 4 embodiment, the tubing head is the same as in the first embodiment. The hanger is locked in the head in the same manner also. The construction of the hanger has, however been modified to engage with the tubing at any desired level and does not therefore have a threaded engagement therewith.

The body 18 of the hanger is cylindrical to fit within the head 1. It has an annular recess on its outer periphery to receive a packing ring 13 as in the previous embodiment. Above the sealing ring the outer surface is cylindrical.

The inner passage through the hanger is adapted to form a seal with the tubing 19 through a seal ring 20 engaged between an upper ring 22

and a lower threaded ring or gland 21. As will be seen in Fig. 4 the gland is recessed on its lower side to allow entrance of the pressure fluid and has a ridge or lip engaging in the lower recess or groove in the seal ring.

Above the sealing member the hanger has a downwardly tapered seat 23 to receive a plurality of pipe engaging slips 24 shaped to fit said seat. The teeth on said slips are upwardly inclined to hold the pipe from downward movement through the hanger. The hanger is internally threaded above the tapered seat to receive the lock ring 25 which may be employed to retain the slips in engagement with the tubing.

A cap or bonnet 5' may be employed for closing the upper end of the tubing head about the tubing after it has been set. This bonnet has a seal about the tubing by means of a stuffing box including a lower supporting collar 27 which rests upon the slips; a set of packing rings 28; and a gland 29. Said gland is tightened in place by means of bolts or screws 30.

In using this device the tubing and hanger are lowered through blow out preventers or other sealing devices into position in the well. Upon the upper section of tubing the hanger is attached at the desired level to hang the tubing in the well. The hanger is then lowered to the seat 6 and rotated to lock with the flange 7 of the head. The safety devices on the head are removed and the bonnet 5' and the stuffing box are adjusted into position and the seal about the flow tube is then complete. Such fittings and Christmas tree connections as desired may be attached to the tubing to equip the well.

It will be seen that our hanger may be inserted and locked in position under pressure. We are enabled to form a sealing support with the tubing head which is not dependent for its sealing effect upon the weight of the tubing. The sealing devices are either expanded by fluid pressure, as in case of rings 13 and 20; or are expanded by glands, as in case of rings 14 and 28, said glands being adjustable to assure a close seal.

Furthermore, in the Fig. 4 species of the invention, the hanger is readily adjustable to hang the tubing at exactly the desired level and still maintain a close seal about the tubing and hanger.

The further advantages of our invention will be obvious to those skilled in the art.

What we claim as new is:

1. A flow head for wells including a tubing head, an inner cylindrical chamber therein, a shoulder in said chamber, a hanger of uniform outer diameter adapted to be lowered through control equipment of the same internal diameter as said head and to fit said chamber and be supported on said shoulder, sealing rings on said hanger engaging with walls of said chamber above the lower end to seal with the same, a flange on said hanger, a flange on the inner wall of said chamber below which said hanger flange may engage, and means to support the tubing in sealing engagement with said hanger, including slip jaws on said hanger supporting said tubing, a bonnet on said head and sealing rings between said bonnet and said tubing.

2. A flow head for wells including a tubing head having a cylindrical upper chamber, a tubing hanger of a uniform outer diameter to engage within said tubing head and slidable therein, means adjacent the lower end of said hanger to latch with said tubing head, a support in said head for said hanger, means on said hanger to seal with said chamber, said hanger having a tubing-receiving longitudinal passage, slips in said hanger to support said tubing, means on said hanger to hold said slips in tubing supporting position, a bonnet closing the upper end of said head, and means to seal between said bonnet and said tubing.

3. A tubing head having an upper cylindrical chamber, a shoulder at the lower end of said chamber, a tubing hanger shaped to be lowered downwardly through control equipment and be supported on said shoulder, means to engage the lower end of said hanger with said head, sealing rings in the cylindrical periphery of said hanger to engage the walls of said chamber and adapted to be expanded by fluid pressure from below the same, a bonnet engageable with the said tubing head to enclose about the tubing above said hanger and out of engagement with said hanger, means to seal between said bonnet and said tubing and means to engage said tubing adjustably with said hanger to prevent relative downward movement of said tubing.

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